WHAT IS CLAIMED IS:

1. A digital vibration transducer for producing a digital signal representative of a vibration of a vibrating member, said transducer comprising:

a laser light source for generating a light beam having an optical axis;

focusing means for focusing said light beam on a detection area;

a reflector disposed across the light beam and defining a reflecting plane at an angle from the optical axis, said reflector being pivotable with respect to a pivot axis extending in said reflecting plane, the reflector reflecting the light beam towards the detection area;

a linkage assembly having a first and a second end, the first end being operatively connected to the vibrating member, the second end being operatively connected to the reflector offset the pivot axis, said linkage assembly converting the vibration of the vibrating member into a pivoting of the reflector about said pivot axis and sweeping the light beam reflected thereby across the detection area;

a sensing and encoding assembly for sensing the light beam in said detection area and producing a digital signal encoded relatively to said sweeping thereof, said digital signal defining the digital signal representative of the vibration of the vibrating member.

2. The digital transducer according to claim 1, wherein said laser light source is a collimated solid-state laser diode.

3. The digital transducer according to claim 1, wherein the pivot axis of the reflector intersects the optical axis of the light beam.

4. The digital transducer according to claim 1, wherein said focusing means comprise an optical arrangement disposed between the laser light source and the reflector.

5. The digital transducer according to claim 4, wherein said optical arrangement comprises a dispersing lens and a focusing objective.

6. The digital transducer according to claim 1, wherein the reflector comprises a substrate of optical glass, and a layer of reflective material deposited thereon.

7. The digital transducer according to claim 1, further comprising a bearing assembly for mounting the reflector about opposite extremities of the pivot axis.

8. The digital transducer according to claim 7, wherein said bearing assembly comprises a pair of vee-bearings respectively contacting the reflector at opposed extremities of the pivot axis.

9. The digital transducer according to claim 1, wherein the linkage assembly comprises:

a linkage arm extending between said reflector and said vibrating member;

a linkage-bearing frame having a center portion connected to the linkage arm at the second end of the linkage assembly and two side portions projecting from the center portion on opposite sides of the reflector; and

two bearing members, each connected to a respective side portion of the linkage-bearing frame and to a side surface of the reflector.

10. The digital transducer according to claim 1, wherein the sensing and encoding assembly comprises:

an encoder for encoding the light beam reflected by the reflector; and

a light sensor for sensing the light beam after encoding thereof.

11. The digital transducer according to claim 10, wherein said encoder comprises an elongated plate extending along said detection area, and provided with a plurality of alternating dark and clear stripes perpendicular to the sweeping of the light beam and respectively blocking and allowing said light beam therethrough,

said encoder thereby converting the vibrating of the vibration member into light pulses.

12. The digital transducer according to claim 11, wherein said sensing and encoding assembly further comprise a pulse counter for counting said light pulses.

13. The digital transducer according to claim 10, wherein the light sensor comprises a silicon cell spanning the detection area.

14. The digital transducer according to claim 10, wherein said light sensor is a photodiode, said digital transducer further comprising light redirecting means for redirecting said light pulses.

15. The digital transducer according to claim 14, wherein said light redirecting means comprise a curved mirror extending downstream the encoder, said curved mirror redirecting all of said light pulses towards the photodiode.

16. The digital transducer according to claim 10, wherein said encoder comprises an elongated plate extending along said detection area, and provided with a plurality of alternating reflective and non-reflective stripes perpendicular to the sweeping of the light beam and respectively reflecting and preventing reflection of said light beam towards the light sensor, said encoder thereby converting the vibrating of the vibration member into light pulses.

17. The digital transducer according to claim 1, wherein said light beam has a linear cross-section in said detection area extending perpendicularly to the sweeping of the light beam.

18. The digital transducer according to claim 17, wherein the focusing means comprise a cylindrical lens disposed between the reflector and the sensing and encoding assembly.

19. The digital transducer according to claim 17, wherein the reflecting surface of the reflector has a curvature.

20. The digital transducer according to claim 17, wherein the focusing means comprise a cylindrical dispersing lens and a cylindrical focusing objective extending between the light source and the reflector.

21. The digital transducer according to claim 17, wherein the focusing means comprise a dispersing lens, a cylindrical lens and a focusing objective sequentially extending between the light source and the reflector.

22. The digital transducer according to claim 17, wherein said focusing means comprise a diffraction grating, a dispersing lens, and a focusing objective sequentially extending between the light source and the reflector.

23. The digital transducer according to claim 17, wherein the sensing and encoding assembly comprises:

an encoder for encoding the light beam reflected by the reflector, said encoder comprising a plurality of encoding bands extending along said detection area parallelly to the sweeping of the light beam, the linear cross-section of the light beam crossing each of said encoding bands, each of said encoding bands having a plurality of alternating dark and clear stripes perpendicular to the sweeping of the light beam and respectively blocking and allowing said light beam therethrough, the stripes of neighboring encoding bands being offset each other, the encoding bands thereby converting the vibrating of the vibration member into offset sequences of light pulses; and

a plurality of light sensors each sensing one of said sequences of light pulses.

24. The digital transducer according to claim 1, wherein the sensing and encoding assembly comprises a photosensitive array.

25. The digital transducer according to claim 24, wherein said photosensitive array is a CCD array.

26. The digital transducer according to claim 23, further comprising a comparator circuit for receiving said sequences of light pulses from the light sensors and deducing therefrom said digital signal representative of the vibration of the vibrating member.

27. The digital transducer according to claim 1, wherein said reflector comprises:

two end mirrors extending on either sides of the pivot axis; and

a frame member connecting said end mirrors together.

28. The digital transducer according to claim 27, further comprising a bearing assembly connected to the frame member for pivotally mounting the reflector about the pivot axis.

29. The digital transducer according to claim 28, wherein said bearing assembly comprises:

a rod rigidly affixed to the frame member and extending along the pivot axis; and

a pair of vee bearings connected to respective ends of said rod.

30. The digital transducer according to claim 28, wherein said bearing assembly comprises a suspension wire for suspending the frame member about the pivot axis.

31. The digital transducer according to claim 27, further comprising a beam splitter for splitting the light beam into two light beam components respectively directed towards each of the end mirrors.

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